

## Safety of Vehicles



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## Design to Safety of Vehicles

Basis:           - European type approval according to directive 2007/46/EC  
                  - National (German) Straßenverkehrs-Zulassungs-Ordnung (StVZO)

Addressee:    Vehicle manufacturers

Objective:      Construction of safe motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles with design specification and regulation stipulating the end result to be achieved (e. g. steering effort, braking, lightning, seat belts and restraint systems, speed limiters, tires, emergency braking system, forward vision)

### ROAD SAFETY

Source:  
BG Verkehr



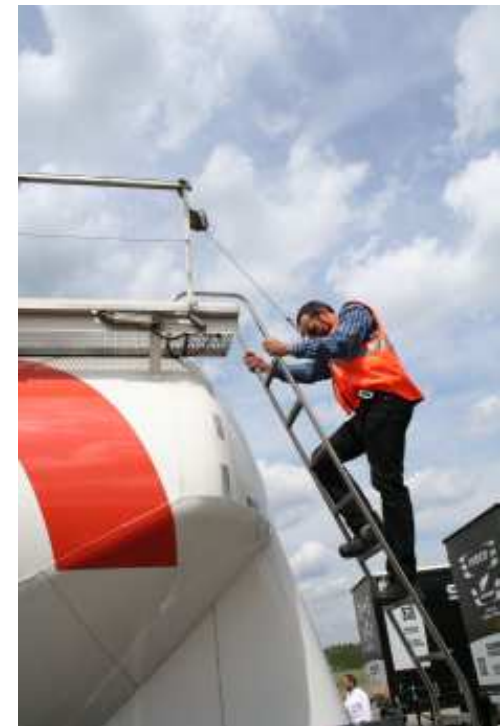
## Design to Safety of Vehicle Superstructure

Basis:           - European machinery directive 2006/42/EC  
                  - National (German) Produktsicherheitsgesetz (ProdSG)

Addressee:    Machinery manufacturers

Objective:      Construction of safe vehicle superstructures (Machinery)

### **OCCUPATIONAL SAFETY**



Source: BG Verkehr

## Safe Driving and Using of Vehicles

Basis: National (German) Straßenverkehrs-Ordnung (StVO)

Addressee: Driver

Objective: Safe driving and using of vehicles

### ROAD SAFETY



# Safe Driving and Using of Vehicles and Vehicle Superstructures

Basis:           - National (German) Betriebssicherheitsverordnung (BetrSichV) incl. the rules of the occupational Safety  
                  - National (German) Unfallverhütungsvorschrift Fahrzeuge (DGUV Vorschrift 70) incl. DGUV rules, principles and information

Addressee:   Employer

Objective:     Selection, provision and check of work equipment (vehicles and machinery)

Addressee:   Employee

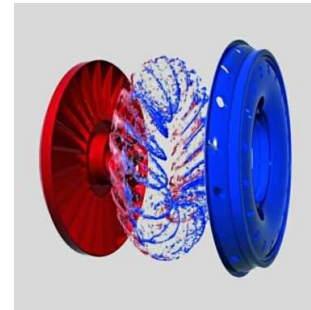
Objective:     Safe driving of vehicles and safe using of work equipment

## OCCUPATIONAL SAFETY

# European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

## Regulations for the construction and the approval for vehicles

- Electric equipment (9.2.2)  
wire, fuse, protected switch, battery, lightning, electric pins between drawing vehicle and trailer, voltage, battery protected switch, steady current circuit
- Brake equipment (9.2.3)  
trailer braking system with automatic anti-lock device, permanent brake



Source: Voith



Source: Voith

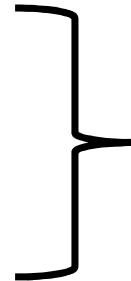
# European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

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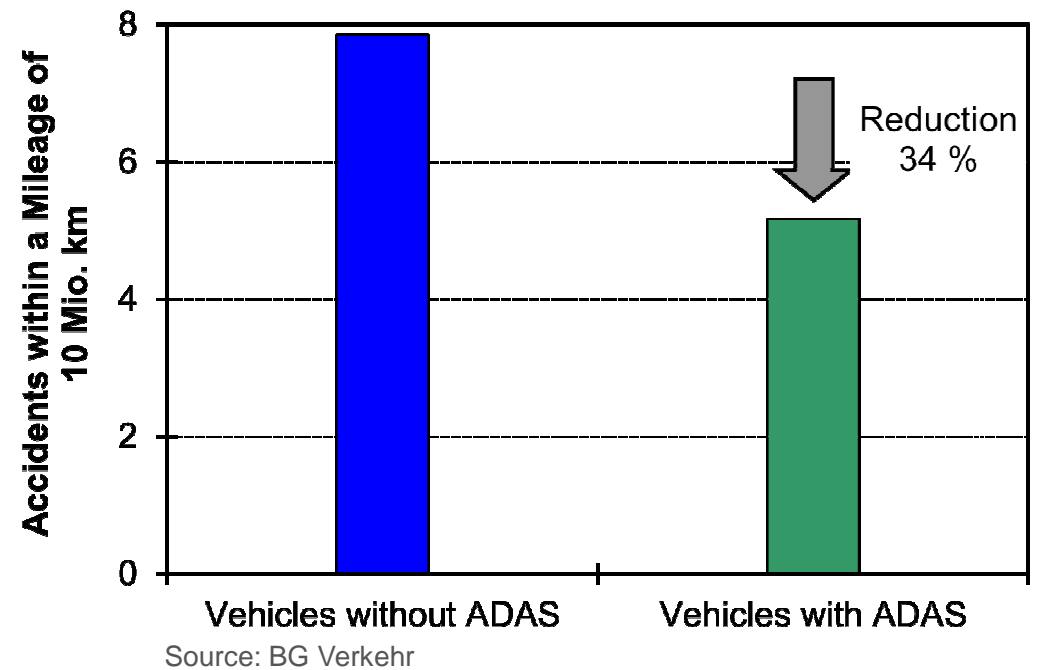
- Prevention of fire hazards (9.2.4)  
fuel tank, engine (if CNG, then acc. to ECE-R 110; if LNG, then acc. to ECE-R 67),  
exhaust system, permanent brake (Thermal protection shield)
- Speed limiter (9.2.5)
- Coupling devices (9.2.6)
- Prevention of risks from fuel (9.2.7)

## Examples for Safe Technical Equipment

- Adaptive cruise control (ACC)
- Electronic stability program (ESP)
- Lane departure warning (LDW)
- Backup warning system
- Camera-Monitor-Systems (CMS)
- Emergency Brake Assist



Source:  
MAN





## Outlook on Automated Driving

- All necessary driver assistant systems are integrated
- The systems never get tired
- The driver only controls the vehicle on long drives and must not seat in a fixed position for a long time
- Physical and mental stress on long drives can be reduced



Source: Daimler